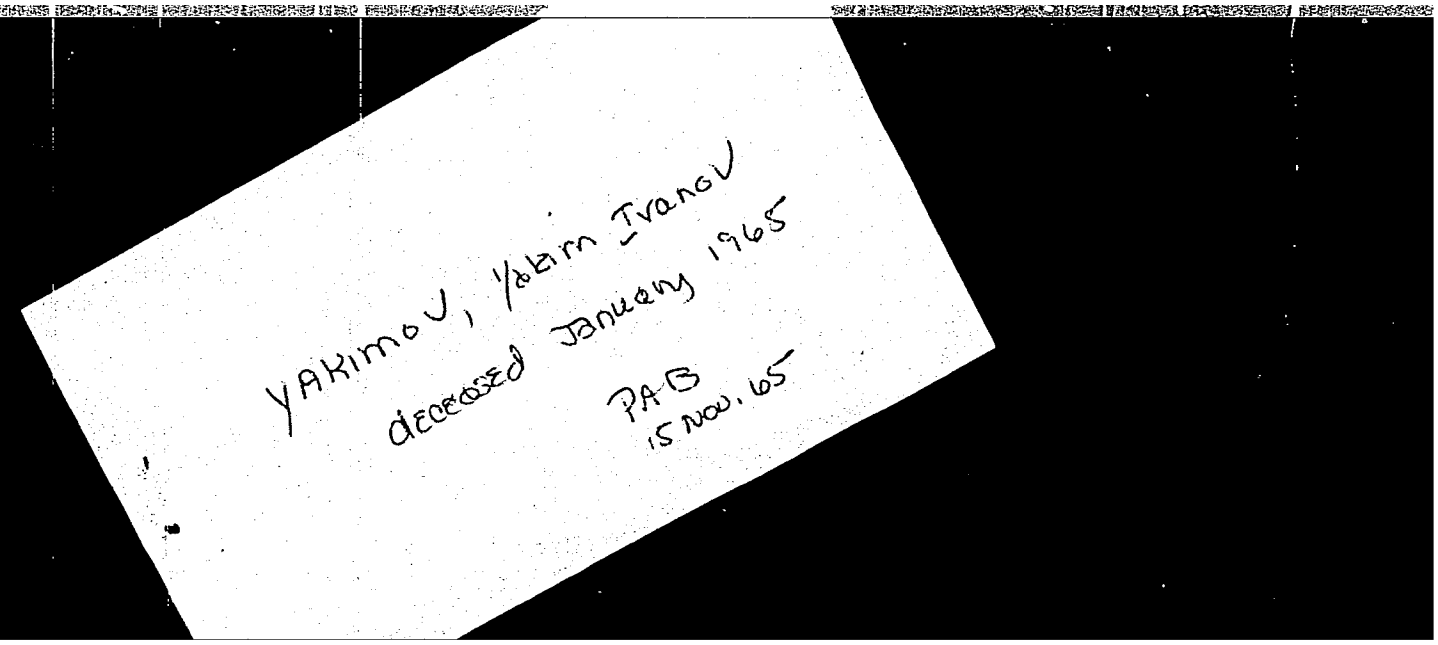

M-8

COUNTRY : USSR
CATEGORY :

ABS. JOUR. : RZBiol., No. 19, 1958, No. 87222

AUTHOR : Yakimov, Ye. S.
INST. :
TITLE : Some Results of Variety Studies of Apple and Pear Trees

ORIG. PUB. : Sad i ogorod, 1958, No 2, 43-46

ABSTRACT : Results of studies, during 1950-1957, of 135 varieties of pomaceous trees, at Ust'-Kamenogorskiy experiment plot, in dark-brown soil and under conditions of irrigation.

CARD: 1/1

76087

COUNTRY : Bulgaria
CATEGORY :
ABS. JOUR. : RZKhim., No. 21 1959, No.
AUTHOR : Yakimov, Ya. I.
INST. : Not Given
TITLE : The Utilization of Bulgarian Lignites in Power Generation Applications

ORIG. PUB. : Tekhnika (Bulgaria), 7, no 8, 1-6 (1958)

ABSTRACT : The characteristics of the four main Bulgarian lignite deposits are described together with the overall results obtained from a physicochemical investigation of these lignites. The results from experiments on the drying of the above lignites and on their utilization in power-generating plants are described.

254

CARD: 1/1

COUNTRY : Bulgaria
CATEGORY : H-22

ABS. JOUR. : RZKhim., No. 16 1959, No. 58456

AUTHOR : Yakimov, Ya. I.
INST. : Not given
TITLE : Problems Encountered in the Combustion of Brown Coals and Methods for Their Elimination

ORIG. PUB. : Tekhnika (Bulgaria), 7, No 9, 3-7 (1958)

ABSTRACT : The combustion of untreated Bulgarian brown coals of 12-22% ash content containing 12-45% moisture and 0.26-1.46% S (working fuel basis [sic]) at power generating plants requires the frequent cleaning of the flues from ash deposits [slagging] and leads to the corrosion of metallic surfaces, damages surrounding vegetation, etc. The author has made a study of methods for achieving an improved utilization of brown coals and recommends the preliminary drying of the coal before combustion as well as the utilization of special slagging-type furnaces.

CARD: 1/1

G. Bonvech

16.3000

S/199/62/003/006/002/002
B172/B112

AUTHOR: Yakimov, Yu. L.

TITLE: Approximation formula for the extension in the conformal mapping of an area with a narrow section

PERIODICAL: Sibirskiy matematicheskiy zhurnal, v. 3, no. 6, 1962, 956-960

TEXT: Lavrent'yev (M. A. Lavrent'yev, B. V. Shabat, Metody teorii funktsiy kompleksnogo peremennogo (Methods of a theory of functions of a complex variable), Gostekhizdat, M., 1958) has devised a method of estimating the absolute amount of the derivative at the boundary of a conformal mapping w of a narrow domain onto a strip of constant width. This estimate is proved under weaker conditions: conditions are imposed on the boundary of the domain to be mapped only in the neighborhood of the point considered; conditions concerning the entire domain are dropped. The estimate proved has the form $\left|\frac{dw}{dz}\right| = \frac{H}{n_1}\left\{1 + \frac{n_1}{6}k_0 + \frac{n_1}{3}k + \frac{n_1^2}{12}k^2 + \frac{1}{3}\delta^2\right\} + R\Big\}$, $|R| < AH^3$.

Designations: H is the width of the strip, n_1 the length of the normal

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Approximation formula for the...

between the point z considered and the intersection z_o with the other boundary of the strip, k_o and k are curvatures, φ is the angle between the normal in z and z_o, A = const; $\frac{1}{H}$ is a given number. There is 1 figure.

SUBMITTED: May 20, 1961

Card 2/2

Yakimov Yu. L.

USSR/Physics - Shock waves FD-3087

Card 1/2 Pub. 85 - 2/16

Author : Yakimov, Yu. L. (Moscow)

Title : Asymptotic solutions to equations of one-dimensional unsteady motion of an ideal gas, and asymptotic laws of damping of shock waves

Periodical : Prikl. mat. i mekh., 19, Nov-Dec 1955, 681-692

Abstract : The problem of damping of spherical and cylindrical shock waves was considered by L. D. Landau ("Shock waves remote from place of occurrence," ibid., 9, No 4, 1945) and Ya. B. Zel'dovich (Vvedeniye v teoriyu udarnykh voln i gazodinamiku [Introduction to theory of shock waves and gas dynamics], Acad. Sci. USSR Press, Moscow, 1946), and by others. In all these works it is assumed that the motion behind the front of the shock wave is weakened and that the motion tends to a traveling wave differing from an acoustic wave only in a more precise value of the speed of sound. In such considerations account is not taken of either the history of formation of the shock wave or the original profile of the wave. In his method L. I. Sedov (Metody teorii podobiya i razmernosti v mekhanike [Methods of theory of similitude and demensions in mechanics], State Technical Press, Moscow, 1954) also obtained only the first term of the asymptotic expansion for the laws of damping of shock waves, since he employed the solution of the linearized system of equations of motion. The method by which Sedov sought the motion of a linearized system of equations of motion is applied by the present author of this work to find the asymptotic

solutions of a nonlinear system of one-dimensional unsteady motion of an ideal gas which contain arbitrary functions. This permits him to obtain the asymptotic laws governing the behavior of shock waves that take into consideration the original form of the wave and also to calculate terms of higher order of smallness. In the first part the author considers three asymptotic solutions of a system of nonlinear equations describing unsteady motions of an ideal gas with spherical symmetry. All solutions are constructed with the aid of functional series. The first two solutions contain one arbitrary function and a finite collection of arbitrary constants. For these solutions the terms are calculated up to the third order of smallness inclusively, and the problem of finding succeeding terms reduces to the solution of a linear algebraic system with constant coefficients. The third solution contains two arbitrary functions and countable set of arbitrary constants; for this solution the first three terms are calculated. In the second part of the work the author considers an example of the application of the obtained solutions with arbitrary functions to the problem of the asymptotic behavior of shock waves. This problem is divided into two parts: investigation of rate of decrease of intensity of shock wave, and investigation of laws governing variation of shape of shock wave. Terms of order of smallness higher than the first are found. Five references: e.g. Courant, Friedrich, translated into Russian.

Institution :

Submitted : April 20, 1955

Yakimov, Yu. L.

20-6-8/48

AUTHOR: Yakimov, Yu. L.

TITLE: On Unsteady Motions of an Incompressible Liquid in Narrow Areas (O neustanovivshikhsya dvizheniyakh neszhimayemoy zhidkosti v uzkikh oblastyakh)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 115, Nr 6, pp. 1080-1083 (USSR)

ABSTRACT: Here the author examines a plane parallel potential motion, which has not become steady of an incompressible liquid with a free surface in a channel with plane bottom. This problem is reduced to the determination of the harmonic function φ (φ here denotes the velocity potential) in that area which is defined by the curve $y(x,t)$ and by the bottom. The boundary conditions belonging to it are given. The author here applies a method suggested by M.A. Lavrent'yev for the solution of this problem. First 4 conditions for the area of the flow are given here. The formula of Lavrent'yev provides an approximated conformal representation of the area of the flow on an infinite strip with the height h. For this strip the formula of Schwartz (formula Shvartsa) of the problem of Dirichlet (zadacha Dirikhle) is then put down. The course of the computations is followed step by step. Obviously the integration of nonlinear systems of partial dif-

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On Unsteady Motions of an Incompressible Liquid in Narrow Areas. 20-6-8/48

ferential equations offers remarkable difficulties. Therefore especially those cases are interesting in which the system of partial differential equations can be transformed into common differential equations. These are the cases already investigated of the flows which have become steady, in narrow areas and the cases with automodel-like ansatzes. The things mentioned here are illustrated by the example of an auto-model-like problem. There- with the liquid may flow against an absolutely stiff wedge. The system of common differential equations corresponding to this case and the figure of the integral curves corresponding to this system is illustrated in a diagram. The integral curves provide the form of the free surface in the z-plane and in the physical plane. There are 2 figures and 3 references, 3 of which are Slavic.

ASSOCIATION: Moscow State University imeni M.V.Lomonosov (Moskovskiy gosudarst- vennyy universitet im. M.V.Lomonosova).

PRESENTED: By Academician M.A.Lavrent'yev, March 30, 1957

SUBMITTED: March 28, 1957
AVAILABLE: Library of Congress
Card 2/2

Yakimov, Yu. L.

20-6-11/42

AUTHOR: Yakimov, Yu. L.

TITLE: Asymptotic Solution of the Equations of the Unidimensional Motion Which has not Become Stationary of a Gas With Three Random Functions (Asimptoticheskoye resheniye s tremya proizvol'nymi funktsiyami uravneniy odnomernogo neustanovivshegosya dvizheniya gaza).

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 6, pp. 937 - 938 (USSR).

ABSTRACT: First the system of equations for the unsteady motion of an ideal gas with spherical symmetry ($\delta = 3$), and the solution of this set of equations are given explicitly. The author makes here some remarks on the procedure of determination of this solution and the following terms of this solution. This solution is set up in form of a series in which case in the equations the terms with equal powers of r and ln r are collected, and set equal zero. In this way the equations for the determination of the unknown functions are obtained. The functions satisfying these equations and which have the properties required, can successively be determined with a finite number of operations. The solution given here comprises the first three terms. In order to solve the problem completely, three finite relations must be found between the variables. The construction of the asymptotic solution discussed here, is analogous to the con-

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Asymptotic Solution of the Equations of the Unidimensional Motion 20-6-11/42
Which has not Become Stationary of a Gas With Three Random Functions.

struction of a solution with two random functions (reference 2). In that work (reference 2) this solution was applied for precising the asymptotic laws of attennuation of spherical percussion waves. An analogous result can also be obtained for other equations of state, and in the case of cylinder - symmetry ($\nu = 2$).
There are 2 Slavic references.

ASSOCIATION: Moscow State University im. M.V. Lomonosov, (Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova)

PRESENTED: April 29, 1957, by L. I. Sedov, Academician.

SUBMITTED: April 2o, 1957.

AVAILABLE: Library of Congress.

Card 2/2

YAKIMOV, Yu. L.: Master Phys-Math Sci (diss) -- "The distribution of shock waves in ideal media with arbitrary physical properties". Moscow, 1958. 6 pp (Moscow State U im M. V. Lomonosov, Mechanics-Math Faculty) 150 copies (KL, No 5, 1959, 144)

YAKIMOV, Yu.L.

Cause of the suppression of waves by rain. Izv.Sib.otd.AN SSSR no.5:125-126 '59. (MIRA 12:10)

1. Institut gidrodinamiki Sibirskogo otdeleniya Akademii nauk SSSR.
(Waves) (Rain)

GRIGORYAN, S.S. (Moskva); MARCHENKO, T.V. (Moskva); YAKIMOV, Yu.L. (Moskva)

Unsteady motion of a gas in shock tubes of variable cross section. PMTF no.4:109-113 Jl-Ag '61. (MIRA 14:10)
(Gas flow) (Electric discharges through gases)

KOROBEYNIKOV, Viktor Pavlovich; MEL'NIKOVA, Nina Sergeyevna; RYAZANOV, Yevgeniy Vasil'yevich; Prinimali uchastiye: KARLIKOV, V.P.; YAKIMOV, Yu.L.; SHUSTOV, S.N., red.; AKSEL'ROD, I.Sh., tekhn.red.

[Point exposion theory] Teoriia tochechnogo vzryva. Moskva, Gos. izd-vo fiziko-matem. lit-ry, 1961. 332 p. (MIRA 14:9)
(Explosions)

YAKIMOV, Yu. L. (Moscow)

"The Strong-Explosion Problem in Media with Complicated Physical Properties."

report presented at the First All-Union Congress on Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb 1960.

33591
S/207/61/000/004/002/012
E032/E514

11.7430
26.2161

AUTHORS: Grigoryan, S.S., Marchenko, T.V. and Yakimov, Yu.L.
(Moscow)

TITLE: Nonsteady motion of gas in shock tubes of variable cross-section

PERIODICAL: Akademii nauk SSSR. Siberskoye otdeleniye. Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no.4, 1961, 109-113

TEXT: The problem is formulated as follows. Consider a vessel separated by a orifice from a shock tube of variable cross-section. The gas contained in the vessel is heated and expands through the orifice into the shock tube which is initially filled with stationary gas. This results in nonsteady-state motion of both gases in the tube, which is completely defined by the initial parameters of the gas in the tube p_o, ρ_o, γ_1, by the mass flow $Q = Q(t)$, by the energy flow through the orifice $N = N(t)$ and by the adiabatic exponent γ_2 of the gas leaving the vessel. The functions $Q(t)$ and $N(t)$ are assumed to be given and are determined by the processes taking place inside the vessel. The problem may

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be solved by approximating these functions by the power functions

$$Q(t) = cqt^{\alpha}, \quad N(t) = Cnt^{\beta}, \quad c = \text{const}, \tag{1}$$

with the cross-section of the tube at a distance X from the orifice given by

$$F(x) = cx^{\nu - 1}, \tag{2}$$

provided

$$(1 + \alpha)(2 + \nu) - \nu(\beta + 3) = 0 \tag{3}$$

The latter condition ensures self-modelling of the problem provided the initial pressure in the tube p_o may be neglected. It is then shown that the problem may be reduced to the solution of a set of ordinary differential equations which have been considered by L. I. Sedov (Ref.1: Similarity and dimensional methods in mechanics, Gostekhizdat, Moscow, 1957). The solution exists provided

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Nonsteady motion of gas ... S/207/61/000/004/002/012
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$$\frac{\beta + 3}{2 + \nu} \equiv \delta > \frac{2}{2 + \nu} \quad . \qquad (8)$$

A detailed discussion is given of the conditions on the shock front and the numerical solution is reported for a conical tube and $\nu = 3$ for $\beta = 7$, $\gamma_1 = \gamma_2 = 5/3$, $\delta = 2$. There are 7 figures and 3 Soviet-bloc references.

SUBMITTED: June 7, 1961

Card 3/3

YAKIMOV, Yu.L.

Approximate formula for an extension in the conformal mapping of a region having a narrow sector. Sib.mat.zhur. 3 no.6:956-960 N-D '62. (MIRA 15:11)

(Conformal mapping)

SOV/24-58-6-5/35

AUTHORS: S.G. Glazunov, I.I. Kornilov and A.M. Yakimova

TITLE: The Effect of Hydrogen on the Structure and Properties of Titanium and its Alloys (Vliyaniye vodoroda na strukturu i svoystva titana i yego splavov)

PERIODICAL: Izvestiya akademii nauk SSSR, otdeleniye tekhnicheskikh nauk, 1958, Nr 6, pp 30-36 (USSR)

ABSTRACT: On the basis of data published by various investigators up to 1956 the authors of this paper constructed a more accurate equilibrium diagram of the system titanium-hydrogen showing the region of low temperature transformations. They arrived at the conclusion that the mechanism of hydrogen embrittlement of titanium is determined by the type of the structure of the alloy, namely: a) In technical titanium and in alloys with the α structure embrittlement is due to the presence of the hydride phase formed as the result of the eutectoid transformation. The main manifestation of the hydrogen embrittlement of the alloys with the α structure is their increased notch sensitivity. b) There is no evidence of the formation of the hydride phase in the

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SOV/24-58-6-5/35

The Effect of Hydrogen on the Structure and Properties of Titanium and its Alloys

alloys with the β or $(\alpha+\beta)$ structure and little is known about the mechanism of embrittlement in alloys of this type. The presence of hydrogen in the $(\alpha+\beta)$ alloys is revealed by low ductility of materials tested for tensile strength at slow rates of loading, and by premature brittle fracture in creep at room temperature. Alloys with the β structure are not sensitive to hydrogen even when it is present in quantities that markedly affect the properties of the α and $(\alpha+\beta)$ alloys. The original properties of titanium alloys, which are adversely affected by the presence of hydrogen, can be restored by a suitable vacuum heat treatment.
There are 28 references (21 English, 3 Soviet, 3 German and 1 French)

Submitted: July 8, 1957

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SOV/24-58-9-3/31

AUTHORS: Glazunov, S.G., Kornilov, I.I. and Yakimova, A.M. (Moscow)

TITLE: The Effect of Hydrogen on the Structure and Properties of Industrial Alloys VT2, VT3 and VT3-1 (Vliyaniye vodoroda na strukturu i svoystva promyshlennykh splavov VT2, VT3, VT3-1)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 9, pp 17 - 24 (USSR)

ABSTRACT: The experimental specimens were prepared from commercial quality, Ti-based alloys of the (α + β) type, the main alloying elements being Cr and Al (alloys VT2 and VT3), or Cr, Al and Mo (alloy VT3-1). The complete chemical analysis of the alloys is given in a table on p 17. An industrial h.f. induction furnace was used for the preparation of the VT2 alloys which were melted in a graphite crucible, in a neutral atmosphere. The VT3 and VT3-1 alloys, melted in a vacuum-arc furnace with a water-cooled copper hearth using a consumable electrode, were characterised by a much lower C, H and N content. To ensure that the effect of H on the properties of the VT2 alloys would not be obscured by the effect of other

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The Effect of Hydrogen on the Structure and Properties of Industrial Alloys VT2, VT3 and VT3-1

metallurgical factors, the following procedure was adopted. Two melts with a maximum H content were selected and one half of this material was vacuum annealed (96 hours at 700 °C). After this treatment which reduced the H content of the alloy from 0.06 to 0.009 wt%, both the treated and untreated materials were normalised (30 minutes at 1 050 °C followed by air cooling). To obtain specimens of the VT3 and VT3-1 alloys with the H content varying between 0.005 and 0.12 wt%, the alloys placed in evacuated quartz ampules together with a quantity of titanium hydride were held for 10 hours at 700 °C and cooled in water. The H content was calculated from the increase of weight of the alloy specimens, the accuracy of this method having been confirmed by the results of the vacuum-fusion and spectrographic analysis. To ensure that all the materials were in the same structural condition, they were heat-treated in the following manner: alloy VT3 - air cooled after 3 hours at 750 °C; alloy VT3-1 - air cooled after 30 min at 870 °C and 1 hour at 650 °C.

The Effect of Hydrogen on the Structure and Properties of Industrial Alloys VT2, VT3 and VT3-1

For the tensile tests of the VT2 and VT3-1 alloys, both the standard and notched test pieces were used (V-notch, 60° angle, 0.5 mm root diameter), the rate of strain being 14.5 mm/min. The tensile strength of the standard and notched specimens ($\sigma_B^{(1)}$ and $\sigma_B^{(2)}$ respectively), elongation, δ, and reduction of area, ψ, of the VT2 alloy with a low and high H content tested at various temperatures (-70 to + 400 °C) are given in Table 1. The effect of the rate of strain, v, on σ_B, δ and ψ of the VT2 and VT3-1 (Table 2) was studied at room temperatures on standard test pieces at v = 0.16, 14.5 and 56.5 mm/min. The impact strength (a), of these two alloys in relation to their H content, q, was determined in the +20 to -70 °C temperature range and the results are reproduced graphically in Figure 1. The thermal stability of the VT3 and VT3-1 alloys was studied by means of room temperature tensile tests (v = 14.5 mm/min) carried out on test pieces heat-treated at 400 and 450 °C

The Effect of Hydrogen on the Structure and Properties of Industrial Alloys VT2, VT3 and VT3-1

for 100 hours. Figures 2 and 3 show how σ_B, δ and ψ of these two alloys (in the untreated state and after treatment at 400 and 450 °C) are affected by their hydrogen content. The fatigue limit and creep resistance of the VT2 alloy with a high and low H content was also tentatively investigated. The analysis of the results of the mechanical tests and examination of the microstructure of the investigated alloys led to the following conclusions: 1) Although the notch sensitivity of the VT2 and VT3-1 alloys at room temperature increases rapidly with increasing H content, the mechanical properties of these alloys as measured by the standard tensile test on unnotched test pieces are not affected by the presence of 0.005 to 0.08% H. 2) Since the tensile strength of the VT2 and VT3-1 alloys increases with increasing rate of strain, the testing procedures for Ti alloys should be standardised. 3) Variation of the H content in the 0.005 - 0.08% range does not affect the low temperature (-40 to -70 °C) impact strength of the VT2 and VT3-1 alloys. 4) When the H content of the VT3 alloy reaches 0.015%,

The Effect of Hydrogen on the Structure and Properties of Industrial Alloys VT2, VT3 and VT3-1

the alloy becomes brittle after 100 hours at 400 or 450 °C. This critical value of the H content can be considerably increased by addition of 1-2% molybdenum. 5) The eutectoid decomposition of the β-phase in the VT3 alloy resulting in the precipitation of an intermetallic compound $TiCr_2$ is accelerated by the presence of 0.015 - 0.035% H. On the other hand, no eutectoid decomposition of the β-phase was observed in the VT3-1 alloy (VT3 alloy with 1.5% Mo) containing up to 0.12% H (Figure 4). 6) A considerable reduction of the H content of the commercial Ti alloys can be attained by the application of the more modern melting technique of vacuum-arc fusion instead of h.f. melting in a neutral atmosphere. 7) If necessary, the H content of VT2 alloys can be considerably reduced by a 12-hour annealing treatment at 700 °C in vacuum of the order:

$$3 = 10^{-3} - 1 \times 10^{-4} \text{ mm Hg.}$$

This treatment increases the ductility of the alloy without

The Effect of Hydrogen on the Structure and Properties of Industrial Alloys VT2, VT3 and VT3-1

lowering its tensile strength, improves the creep resistance but does not affect the fatigue limit of the alloy.
There are 4 figures and 4 tables.

SUBMITTED: July 8, 1957

Card 6/6

SOV/24-58-12-15/27

AUTHORS: Blok, N.I., Glazova, A.I., Lashko, N.F. and Yakimova, A.M. (Moscow)

TITLE: Influence of Hydrogen on Structural Transformations in Titanium Alloys (Vliyaniye vodoroda na strukturnyye prevrashcheniya v titanovykh splavakh)

PERIODICAL: Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 12, pp 96-99 (USSR)

ABSTRACT: The influence of hydrogen on the plastic properties of titanium alloys, which has recently been widely studied, varies with the form of the titanium in the alloy. The object of the work described was to investigate the influence of hydrogen on structural transformations in alloys with an $\alpha + \beta$ solid solution structure. Alloys VT3 and VT3-1, were studied, their respective compositions being: 0.04, 0.04% C; 2.78, 11.93% Cr; 4.9, 4.6% Al; - , 1.5% Mo; 0.20, 0.24% Fe; 0.04, 0.027% Si; 0.10, 0.11% O; 0.028, 0.042% N. The method used consisted of the non-aqueous electrolytic separation of phases, whose structures were then investigated with X-rays. The alloys were also studied metallographically. Saturation with hydrogen was effected by sealing the

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Influence of Hydrogen on Structural Transformations in Titanium Alloys

cylindrical specimen and titanium hydride in an evacuated quartz tube and heating to 700°C for 10 hours. Specimens with 0.005, 0.015, 0.025, 0.035, 0.05 and 0.12 wt.% hydrogen were obtained. They were subjected to differing heat treatments. It was found that in the VT3 alloy containing 0.015-0.035% hydrogen the eutectoidal reaction $\beta \rightarrow \alpha + TiC\gamma_2$ is faster than in the hydrogen-free alloy; with 0.05-0.06% hydrogen the β-phase forms titanium hydride on heating; with 0.12% hydrogen the residual β-phase is stabilized and there is no eutectoidal reaction either on cooling after annealing or on heating for 100 hours at 400-450°C. In the VT3-1 alloy containing molybdenum the residual β-phase did not decompose after annealing and heating at 400 and 450°C for 100 hours irrespective of the hydrogen content in the range studied. In both types of alloy the β-phase unit cell parameter increases with hydrogen content (Fig.1 shows this effect for the VT3-1 alloy heat-treated in various ways). During the heating

Influence of Hydrogen on Structural Transformations in Titanium Alloys

of both alloys at 400-450°C the residual β-phase is enriched in chromium and molybdenum and, possibly, loses hydrogen. There are 3 figures, 3 tables and 6 references of which 5 are English and 1 Soviet.

SUBMITTED: 8th August 1957.

18.1285

66225
SOV/126-8-3-8/33

AUTHORS: Kornilov, I.I., Glazunov, S.G. and Yakimova, A.M.

TITLE: Influence of Hydrogen on the Properties of a Higher Creep Limit VT-8 Alloy

PERIODICAL: Fizika metallov i metallovedeniye, 1959, Vol 8, Nr 3, pp 370-377 (USSR)

ABSTRACT: The present paper is a continuation of a series of papers dealing with the study of the influence of hydrogen on the properties of commercial titanium alloys of α + β-structure. The aim of the present investigation was to study the influence of different hydrogen contents on the properties of the VT-8 alloy (residual deformation not more than 0.2% after 100 hours at a stress of 24 kg/mm² at 500°C). The following melts of the VT-8 alloy were studied: (1) melt 7: 6.3% Al, 2.9% Mo, 0.12% Fe, 0.08% Si, 0.1% O_2 at the following hydrogen contents: 0.005, 0.015, 0.025, 0.05 and 0.08%; (2) melt 8: 6.3% Al, 3.25% Mo, 0.20% Fe, 0.07% Si and 0.2% O_2 at the same hydrogen contents; (3) melt 10-1: 6.6% Al, 3.0% Mo, 0.05% Fe, 0.04% Si and 0.1% O_2 at the following hydrogen contents: 0.005, 0.015, 0.025%; (4) melt 10-3: 6.6% Al, 3.0% Mo, 0.05% Fe, 0.04% Si and 0.3% O_2 at the same hydrogen content as (3).

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Influence of Hydrogen on the Properties of a Higher Creep Limit VT-8 Alloy

The alloys were saturated with hydrogen in a specially constructed universal instrument for the saturation of metals with gases and for the analysis of hydrogen. Extremely pure hydrogen was obtained by thermal dissociation of titanium hydride; the saturation temperature was 700°C. Melts of the VT-8 alloy with different oxygen contents were obtained by alloying with titanium dioxide. An identical initial state of the billets after saturation was ensured by subsequent heat treatment which was carried out in electric furnaces in air atmosphere. The heat treatment of the VT-8 alloy consisted in annealing at 880°C for 1 hour, followed by cooling in air. The mechanical properties were investigated by using Gagarin-type specimens at a straining rate of 2.5 mm/min (Fig 1). The properties were investigated of specimens in the original condition (880°C - 1 hour), of specimens aged at 500°C for 100 hours and specimens aged under a stress σ = 10 kg/mm^2 at 500°C for 100 hours. The UTS was found to have increased after ageing from 112 to 125 kg/mm^2 and to have changed little

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with increase in hydrogen content. Fig 2 shows the dependence of the mechanical properties of the VT-8 alloy on the hydrogen content and the rate of testing. (Full lines - annealed at 880°C for 1 hour: dashed lines - annealed at 80°C for 1 hour followed by 500°C for 100 hours.) Fig 3 shows the dependence of impact resistance of the VT-8 alloy on the hydrogen content and the testing temperature. Metallographic investigation of the VT-8 alloy with various hydrogen contents was carried out. At room temperature, the alloy has a two-phase α + β-structure. The effect of hydrogen on the structure of the alloy consists in coarsening the structural components as the hydrogen content increases (Fig 4 and 5) and apparently also in increasing the quantity of untransformed β-phase. Fig 6 and 7 show the results of tensile testing of two VT-8 alloys containing 0.1 and 0.3% oxygen, respectively, in relation to the hydrogen content. Fig 8 and 9 show photomicrographs of two VT-8 alloys with an oxygen content of 0.1 and 0.3% and different hydrogen contents. An investigation of the influence of hydrogen

Influence of Hydrogen on the Properties of a Higher Creep Limit VT-8 Alloy

on the creep of the alloy VT-8 was carried out. Two VT-8 alloys of 0.1 and 0.2% oxygen and 0.005, 0.015 and 0.025% hydrogen were investigated for creep properties at 500°C after 100 hours at a stress of 10 kg/mm^2. As the hydrogen content increased from 0.005 to 0.025 an increase in the residual deformation was observed (see Table 1). The influence of hydrogen on the stabilization of the residual β-phase in the VT-8 alloy under various heat treatments is shown in Table 2. The authors arrive at the following conclusions: (1) Investigation of the influence of hydrogen within the limits 0.005 and 0.05% on the mechanical properties of the VT-8 alloy has shown that a considerable lowering of plastic properties occurs at a hydrogen content of 0.015% which is associated with the instability of the β-phase in the structure and its decomposition. (2) The investigation of the influence of hydrogen on the properties of the above alloy at various straining rates has shown that the plasticity of the alloy decreases considerably at low testing rates, particularly when the hydrogen content is increased. The UTS of the

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alloy increases from 109 to 117 kg/mm^2 on increasing the testing rate from 0.17 to 48.2 mm/min respectively (at a hydrogen content of 0.005%). (3) The impact resistance of the alloy at room temperature and sub-zero temperatures (-78 to -196°C) changes relatively little in the hydrogen content range of 0.005 to 0.08%. The testing temperature exerts a considerably greater influence than the hydrogen content up to 0.08%. (4) As the oxygen content increases, the hydrogen exerts an ever increasing unfavourable influence on the properties of the alloy. (5) In the investigation of the influence of hydrogen on the creep of the alloy at 500°C in 100 hours, it has been found that as the hydrogen content increases, the extent of residual deformation increases. Oxygen increases the creep resistance of the alloy. (6) The phase analysis of VT-8 alloys with different hydrogen contents has confirmed the presence of residual β-phase in the structure. At low hydrogen contents (up to 0.015%) the residual β-phase is unstable and during ageing a redistribution of molybdenum between the α and β-phases takes place. As the

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hydrogen content increases, the β-phase becomes stable and its unit cell parameter increases. There are 9 figures, 2 tables and 9 references, 2 of which are Soviet and 7 English.

SUBMITTED: June 21, 1958

Card 6/6

YAKIMOVA, A.M.

PHASE I BOOK EXPLOITATION SOV/4508

Akademiya nauk SSSR. Institut metallurgii

Titan i yego splavy, vyp. 3: Metallovedeniye titana (Titanium and Its Alloys, No. 3: Metal Science of Titanium) Moscow, Izd-vo AN SSSR, 1960. 161 p. Errata slip inserted. 2,700 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova.

Resp. Ed.: N.V. Ageyev, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: M.L. Podgoyetskiy; Tech. Ed.: Ye. V. Makuni.

PURPOSE: This collection of articles is intended for scientific research workers and metallurgical engineers.

COVERAGE: The articles summarize results of experimental studies of titanium-base alloys. The microstructure and mechanical properties of titanium-base alloys containing aluminum, chromium or other metals are analyzed along with the effect of oxygen, hydrogen and heat treatment on alloy structure and properties. The tendency of titanium alloys to embrittlement as a result of strain aging is emphasized, and the nitriding of titanium, carried out to increase the surface strength and wear resistance of titanium alloys, is described. Transformations occuring in commercial titanium under conditions of electric heating are examined. Attempts to develop titanium-base alloys capable of withstanding temperatures over 400°C are discussed as are problems of titanium-powder metallurgy and weldability of certain titanium-base alloys. No personalities are mentioned. Most of the articles have bibliographic references, the majority of which are Soviet.

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(15)

YAKIMOVA, A.M.

PHASE I BOOK EXPLOITATION SOV/4617

Akademiya nauk SSSR. Komissiya po analiticheskoy khimii

Analiz gazov v metallakh (Analysis of Gases in Metals) Moscow, 1960. 324 p. (Series: Its: Trudy, tom. 10) Errata slip inserted. 4,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut geokhimii i analiticheskoy khimii imeni V.I. Vernadskogo. Komissiya po analiticheskoy khimii.

Resp. Ed.: A.P. Vinogradov, Academician; Ed. of Publishing House: A.L. Bankvitser; Tech. Ed.: V.V. Bruzgul'.

PURPOSE: This book is intended for laboratory personnel concerned with gas analysis in metals.

COVERAGE: This collection of articles is based on materials of the Commission on Analytical Chemistry AS USSR on problems dealing with gas analysis in metals. The articles present data on: 1) The vacuum-fusion method, developed by European scientists and the Soviet scientists N.P. Chizhevskiy and Yu.A. Klyachko, for the analysis of gases in steel and aluminum, and now applicable to analysis of gases in other metals. 2) The research of Z.M. Turovtseva and coworkers at the Institute of Geochemistry and Analytical Chemistry imeni V.I. Vernadskiy AS USSR, Moscow, making it possible to evaluate the practicability and fields of application of the different analytical methods. 3) The contributions of Yu.A. Klyachko and coworkers in their study of thermodynamic methods for the evaluation of suitable conditions for carrying out analysis. 4) The determination of gases in metals by the sulfurous method as developed by A.K. Babko. 5) The spectrum isotope method for the determination of hydrogen as developed by A.N. Zeydel' and coworkers. The authors of these articles systematize and review critically the various analytical methods, describe the apparatus used in analysis, and indicate the basic trends of research. References accompany most of the articles.

AVAILABLE: Library of Congress

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YAKIMOVA, A.M.

Interaction between titanium and hydrogen. Trudy kom.anal.khim. (MIRA 13:8)
10:142-149 '60.
(Titanium) (Hydrogen)

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31052
S/126/61/012/004/008/021
E193/E383

AUTHORS: Kornilov, I.I. and Yakimova, A.M.

TITLE: The effect of hydrogen on the structural properties of alloys T3, T4, T6 and T8

PERIODICAL: Fizika metallov i metallovedeniye, v. 12, no. 4, 1961, 550 - 557

TEXT: The alloys T3, T4, T6 and T8 represent a group of alloys of the six-component Ti-Al-Cr-Si-Fe-B system, differing in the Al content only, the total content of the remaining alloying additions being constant at 1.2 - 1.6%. The Al content of the experimental alloys was 3% (T3), 4.26% (T4), 6.08% (T6) and 7.37% (T8), their oxygen and nitrogen content being 0.09% and 0.03%, respectively. Hydrogen (0.005, 0.015, 0.025, 0.05 or 0.08%) was introduced by heating in vacuum at 700 °C in the presence of titanium hydride. The effect of hydrogen was studied by metallographic examination, mechanical testing and X-ray diffraction. Tensile tests were carried out at room temperature at strain rates of 0.16, 11.3 and 48.2 mm/min. The impact strength was determined at +20 and -78 °C. Thermal

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The effect of hydrogen on ...

stability (resistance to oxidation) was studied by holding the alloys for 100 hours at 450 and 500 (T3 and T4) or 500 and 550 °C (T6 and T8) and subjecting them to tensile tests at room temperature. Several conclusions were reached. 1) Addition of up to 0.25% hydrogen slightly increases the room-temperature tensile strength of the alloys studied without significantly affecting their plasticity with the exception of the alloy T8. This is illustrated in Fig. 2, where reduction of area (Ψ, %, vertical scale) is plotted against the hydrogen content (%) and strain rate (v, mm/min) used during the tensile test. These results were attributed to the fact that the l a t t i c e of the α-phase was only slightly distorted by hydrogen owing to its small atomic radius. The loss of ductility in alloy T8 is most likely associated with the precipitation of brittle α_2-phase. 2) The impact strength of alloys T4, T6 and T8 at room and sub-zero temperatures is not affected by the variation of the hydrogen content in the 0.005 - 0.08% range. Alloy T3 is an exception because of low

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solubility of hydrogen in alloys with 3% Al. In the case of this alloy, the impact strength at room temperature falls from 4 kgm/cm^2 at 0.005% hydrogen to 1.0 kgm/cm^2 at 0.08%, the corresponding decrease in the impact strength at -78 °C being from 3.2 to 0.8 kgm/cm^2. 3) Thermal stability of the alloy T8 is strongly affected by the variation of its hydrogen content which, however, does not affect this property in the case of alloys T3, T4 and T6. This is indicated by data given in Table 3, showing the various mechanical properties of the alloys studied after preliminary treatment consisting of heating in air at various temperatures for various times. 4) X-ray - diffraction analysis revealed the presence of a residual β-phase in the alloys studied. The α- and β-phases are not in equilibrium and a transformation takes place when these alloys are held for 100 hours at 450 - 550 °C, as a result of which the state of equilibrium is reached. This transformation is accompanied by redistribution of the alloying elements between the α- and β-phases, the β-phase becoming enriched with Cr and Fe.

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5) The lattice parameter of the β-phase in the alloys T3 and T4 is unaffected by the presence of hydrogen. In the case of alloys T6 and T8, hydrogen dissolving in the β-phase on heating considerably increases its lattice parameter.

Acknowledgments are expressed to N.I. Blok, A.I. Glazova and N.F. Lashko. There are 5 figures, 3 tables and 7 references: 5 Soviet-bloc and 2 non-Soviet-bloc.

SUBMITTED: February 14, 1961

Card 4/4

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S/126/61/012/006/014/023
E193/E383

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AUTHOR: Yakimova, A.M.

TITLE: Effect of hydrogen and oxygen on structure and mechanical properties of a titanium alloy T4

PERIODICAL: Fizika metallov i metallovedeniye, v.12, no. 6, 1961, 891 - 899

TEXT: It has been shown earlier (Ref. 1: I.I. Kornilov, S.G. Glazunov and A.M. Yakimova - FMM, 1959, 8, no. 3) that hydrogen embrittlement of a two-phase ($\alpha + \beta$), Ti-base alloy BT8 (VT8), containing Al and Mo, becomes more pronounced when the oxygen content in the alloy is increased from 0.1 to 0.3%. This prompted the present author to study the combined effect of hydrogen and oxygen on structure and properties of a single-phase (α) Ti-base alloy T4, which, in addition to 4% Al, contains Cr, Fe, Si and B. The experimental alloy was prepared by vacuum melting, oxygen being introduced in the form of TiO_2.

Test pieces for mechanical tests were prepared from hot-forged rods. Hydrogen was introduced by a vacuum treatment at 700 °C in the presence of pure hydrogen obtained by dissociation of

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titanium hydride. The test pieces were heat-treated by holding for 30 min at 800 °C and air-cooling. The experimental work included tensile tests, impact tests at room temperature and at -196 °C, and metallographic examination. In addition, tensile tests at room temperature were carried out on specimens preliminarily held for 100 h at 400, 450 and 500 °C. The results can be summarized as follows.

1) UTS, elongation and reduction of area of alloy T4 are practically unaffected by the addition of hydrogen in the concentration range studied (0.005 - 0.025%). The effect of oxygen is more pronounced, UTS of alloys with 0.1, 0.2 and 0.3% O being 81.0, 89.5 and 101.5 kg/mm^2, respectively, the corresponding figures for elongation being 11.3, 12.8 and 13.6%, and for reduction of area 39.5, 32.2 and 33.1%.

2) The effect of oxygen on the impact strength of alloy T4 is also more pronounced than that of hydrogen. The combined effect of these two impurities is demonstrated in Fig. 1, where the impact strength (a_k, kgm/cm^2) is plotted against the oxygen

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content (0.1 to 0.3%) and hydrogen content (0.01 to 0.08%) in the alloy, the continuous and broken curves relating, respectively, to results obtained at room temperature and at -196 °C. It will be seen that the embrittling effect of oxygen is particularly pronounced at low temperatures.

3) Ageing at high temperature, particularly at 400 °C, brings about a marked increase in the UTS of alloy T4. The higher the oxygen content of the alloy, the greater is the gain in UTS due to ageing; an alloy containing 0.3% O and 0.025% H attains UTS of approx. 123 kg/mm^2. The combined effect of O and H on elongation is small. However, the reduction in area of alloys with a high O content decreases after ageing, maximum decrease (from 33.1% in the annealed condition to 22.6% after 100 h at 500 °C) being attained in specimens with 0.3% O and 0.005% H. This effect can be attributed to the fact that the residual β-phase in an alloy with 0.3% O and 0.005% H is unstable and redistribution of alloying elements between the α- and β-phases takes place during ageing. That such a distribution does, in

fact, take place has been confirmed by the results of micro-hardness measurements of the α-phase and the eutectoid constituents (in alloys with a higher H content the β-phase is stable).
4) Metallographic examination has revealed that both H and O accelerate the process of eutectoid decomposition in alloy T4 during ageing at 400 - 500 °C.
5) At high ageing temperatures (500 °C) the rate of eutectoid decomposition increases and coalescence of the eutectoid constituents takes place.
There are 8 figures, 4 tables and 7 references: 6 Soviet-bloc and 1 non-Soviet-bloc. The English-language reference mentioned is: Ref. 4: C.E.P. Bevington, S.L. Martin and D.H. Mathews: Met. Abstn., 1952, 19, 504.

ASSOCIATION: Institut metallurgii AN SSSR imeni A.A. Baykova (Institute of Metallurgy of the AS USSR imeni A.A. Baykov)

SUBMITTED: February 14, 1960

Card 4/4

S/762/61/000/000/012/029

AUTHOR: Yakimova, A.M.

TITLE: The hydrogen content in the β phase of BT3-1 (VT3-1) and BT8 (VT8) alloys.

SOURCE: Titan v promyshlennosti; sbornik statey. Ed. by S. G. Glazunov. Moscow, 1961, 131-134.

TEXT: The paper describes a newly developed method for the quantitative determination of the H content in the β phase of two-phase alloys (the Ti-Al-Cr-Mo system of the VT3-1 alloy and the Ti-Al-Mo system of the VT8 alloy) and its effect on the parameters of the elementary lattice of that phase. The practical significance of this work is manifested by the great variability of the H content and the lattice parameters which, according to Wasilewski, R.Y., and Kehl, G.L., (Metallurgia, v.50, no. 301, 1954) are attributable to the greater diffusion rate of H in the β modification than in the α modification of Ti; numerical values cited are by A.D.McQuillan (Univ.of Birmingham, lecture, 1956), as modified by Tien-shih-liua and M.A.Steinberg (Trans. ASM, v.50, 1938 // Abstracter's Note: more likely 1956 or 1958 //) for the effects of elements that stabilize the β phase at room temperature, and as refined by the radioautographic experiments by Huber, O.(J.of Met.,

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v.9, no.7, Sect.2, 1957) and Bruk, B.I., and Nikolayev, G.I. (Akad.n.SSSR, v.116, no.1, 1957). Method: The H content was determined in the electrolytically precipitated β phase (Blok, N.I., et al., Zavodskaya laboratoriya, no.1, 1956) by means of vacuum heating in the author's universal equipment for gas saturation of metals and H analysis (In Trudy komissii po analiticheskoy khimii, "Analiz gazov v metallakh," Akad.n.SSSR, v.X, 1960). The alloy specimens were H-saturated to a concentration of 0.005, 0.015, 0.025, and 0.050% with high-purity H obtained by thermal Ti-hydride dissociation within the universal equipment itself. H saturation was performed at 700° for 10 hrs. The electrolytically precipitated β phase was briquetted into 0.02-0.03-g, 5-mm-diam, specimens on a manual press and was weighed on an analytical balance scale with an accoracy of ± 0.0001 g. Purpose of the briquetting: Avoidance of losses by dust carry-off in the vacuum equipment. It was found that the β phase becomes H-saturated in the process of the washing of the anode precipitated with methanol, but that the H thus adsorbed is readily eliminated in a $1 \cdot 10^{-5}$-mm Hg vacuum at 300°C. The H within the β solid solution requires heating to 700-900° for elimination (T actually employed: 900°C). Control: Washing of the precipitate with a solvent not containing H ions, namely, CCl_4, which yielded an absence of H at 300° and an H content in the β phase equal (within the error of the method) to that previously obtained. Findings: (1) The two phases in VT3-1 and VT8, in the initial state, are not in equilibrium; (2) 450-500° aging leads to transformations toward

phase equilibrium and redistribution of alloying elements between the α and β phases; (3) H enlarges the parameter of the elementary lattice of the β phase both in the initial state and the aged state of the alloys investigated; (4) these first experimental determinations of the H content in the β phase of the VT3-1 and VT8 alloys show that it depends both on the total H content and on the chemical composition of the given alloy. There are 2 tables and 7 references (3 Russian-language Soviet, 4 English-language; all cited in text. N. F. Lashko's collaboration in the tests is acknowledged.

ASSOCIATION: None given.

S/762/61/000/000/013/029

AUTHORS: Blok, N.I., Glazova, A.I., Yakimova, A.M., Lashko, N.F.

TITLE: Investigation of the β phase of the two-phase alloys BT3-1 (VT3-1) and BT8 (VT8).

SOURCE: Titan v promyshlennosti; sbornik statey. Ed. by S. G. Glazunov. Moscow, 1961, 135-141.

TEXT: The paper describes an experimental investigation of the mechanism of H embrittlement of two-phase Ti alloys in which residual β-phase decomposition with separation of chemical compounds does not occur. Whereas in the Ti-Al-Cr alloy BT3 (VT3) the residual β phase decomposes and segregates $TiCr_2$ and TiH, and thus becomes embrittled, the Ti-Al-Cr-Mo alloy VT3-1 and the Ti-Al-Mo alloy VT8 do not incur such process. X-ray metallography of anode precipitates of these alloys reveals the existence of a β phase alone, in which the elementary-lattice parameter increases with increasing H content in the alloy. The particular objective of the present test is the investigation of the enrichment of the β phase with heavier elements, such as Cr and Mo, the atomic radii of which are smaller than the atomic radius of Ti, during 100-hr aging at 450-500°C. The method employed comprises the electrolytical phase separation (Blok, N.I., et al.,

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Investigation of the β phase of the two-phase alloys... S/762/61/000/000/013/029

Zavodskaya laboratoriya, no.1, 1956) and X-ray metallography. The electrolytical phase separation was performed by an improved method of anodic dissolution of metals in a waterless electrolyte (2-3 g KSCN, 10 g citric acid, 100 ml glycerol, and 1,200 ml methanol), a current density of 0.01 a/cm^2, a terminal voltage of 30 v, and a bath temperature of -7 to -10°C. Maximum time 45 min. Introduction and withdrawal of the sylindrical specimen was performed under current; the specimen was then washed twice in methanol at -7° and was air-dried. The anodic precipitate was scraped off the specimen and preserved at sub-0°C temperature. The Ti, Cr, and Mo contents in the β phase were determined by the usual methods. The H content therein was determined in the universal equipment of A.M.Yakimova (In Trudy komissii po analiticheskoy khimii, "Analiz gazov v metalle," Akad.n.SSSR, v.X, 1960) according to the method described by Yakimova in her paper on pp.131-134 of the present compendium (Abstract S/762/61/000/000/012/029); chemical analysis is possible only when a single phase is present. Test results are summarized in a full-page table and are graphed. Results: (1) The Cr and Mo content in the β phase of VT3-1 and the Mo content in the β phase of VT8 are considerably greater than their mean content in the alloys. The Al content in the β phases is lower than its mean content in either alloy. For example, the β phase of VT3-1 alloy contains 9.24% Cr, 10.44% Mo, and 2.05% Al, as against 1.93% Cr, 1.5% Mo, and 4.6% Al mean content in the alloy. The β phase of the VT8 alloy contains 25.38% Mo and

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2.44% Al, as against 3.45% Mo and 6.33% Al mean content. (2) Aging of VT3-1 and VT8 alloys entails β-phase enrichment with alloying elements; this is an indication of the occurrence of transformations toward phase equilibrium. (3) The H content of the β phase depends on its total content in the alloy and on the alloying-element enrichment in the β phase. (4) The residual β-phase content of VT3-1 and VT8 alloys increases with increasing H content therein. There are 2 figures, 3 tables, and 4 Russian-language Soviet references cited in the text. The participation of Ye.A. Vinogradova and Ye.I. Zvontsova in the experimental work is acknowledged.

ASSOCIATION: None given.

S/762/61/000/000/019/029

AUTHOR: Yakimova, A.M.

TITLE: Mechanical properties and structure of the BT9 (VT9) alloy of the Ti-Al-Mo-Sn-Si system as a function of its hydrogen and oxygen content.

SOURCE: Titan v promyshlennosti; sbornik statey. Ed. by S. G. Glazunov. Moscow, 1961, 203-215.

TEXT: The paper describes an experimental investigation founded upon earlier analogous investigations by the authoress and her associates on the effect of H and O on the embrittlement of two-phase Ti alloys in which the dependence of H embrittlement on the chemical composition and the gaseous-admixture content of such alloys was identified. H saturation was performed in the universal equipment described by the authoress in her paper "Universal equipment for the saturation of metals with gases and H analysis" (Trudy komissii po analiticheskoy khimii, Akad.n.SSSR, v.X, 1960). High-purity H was produced within the equipment itself by dissociation of Ti hydride. Saturation T : 900°C, soaking time 10 hrs. Introduction of O was performed by alloying with Ti dioxide. Tensile tests were performed at 3 rates: 0.16, 11.3, and 48.2 mm/min (data summary on full-page table and 2 figs). The plasticity characteristics of a VT9 alloy with 0.1% O and 0.015% H are impaired significantly; this is attributed to the presence in the structure of an unstable β phase and to its

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Mechanical properties and structure of the BT9 (VT9).. S/762/61/000/000/019/029

decomposition. The plasticity is significantly smaller at low rates of extension than at high rates; this variation becomes accentuated with increases in the O and H content of the alloy. Cross-sectional necking of an alloy with 0.2% O and 0.005% H is 23.2% at a rate of 11.3 mm/min as against 7.2% at 0.16 mm/min. The tensile strength of the same alloy is 127.5 kg/mm^2 at 0.16 mm/min and 135.5 kg/mm^2 at 48.2 mm/min. An increase in O and H content in the VT9 alloy leads to an intense embrittlement; this is attributed to the low solubility of the O and H in Ti. The notch-toughness of the VT9 alloy with 0.1% O is affected comparatively little by H-content variations from 0.005 to 0.08% at room temperature and at -78°C. An increase in O content reduces the notch-toughness of this alloy severely; notch sensitivity is increased sharply thereby. In increase in H content lowers the creep resistance of the VT9 alloy; O enhances the creep limit of the alloy. Both H and O diminish the thermal stability of the VT9 alloy. A H content of from 0.005 to 0.08% affects the structure of the VT9 comparatively little. If the O content increases to 0.15% and higher, the structure is observed to contain an increasing quantity of non-transformed α phase, whereupon the structure becomes nonuniform, especially after 100-hr aging at 500-550°. There are 6 figures, 5 tables, and 4 Russian-language Soviet references.

ASSOCIATION: None given.

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39076
S/180/62/000/003/011/016
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18.1275

AUTHORS: Kornilov, I.I. and Yakimova, A.M. (Moscow)

TITLE: Creep and structure of alloys of the titanium-oxygen-hydrogen and titanium-aluminium-hydrogen systems

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no. 3, 1962, 88 - 93

TEXT: Since most Ti alloys contain H, O and Al (the first two as impurities, the last as the main strengthening alloying addition), the effect of these elements on the structure and creep-resistance of Ti was studied. The composition (wt.%) of the experimental alloys varied within the following limits: 0.1-1.63% O, 0.005-0.05% H and 1.05-7.86% Al. Creep tests were carried out at 500-550 on the Ti-O-H alloys and at 500 - 650 °C on the Ti-Al-H alloys, under a stress of 7 kg/mm^2 in the former and 15 kg/mm^2 in the latter case; the results, correlated with the results of metallographic examination, led to several conclusions. 1) The creep resistance of Ti-O-H alloys decreases

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with increasing H content, oxygen having the opposite effect. Thus, for instance, the deformation of specimens containing 0.1% O and 0.005, 0.025 and 0.05% H after 5 h at 500 °C under a stress of 7 kg/mm^2 was, respectively, 10, 29 and 48 mm; the corresponding figures for alloys containing 0.05% H and 0.1, 0.2 and 1.2% O being 48, 20 and 1 mm. 2) As the O content of Ti increases, the solubility of H in the metal decreases. In addition, a change in the O content brings about redistribution of H between the α- and γ-phases. 3) The creep resistance of the Ti-Al-H alloys also decreases with increasing concentration of H, the deformation of alloys containing 3% Al with 0.005, 0.025 and 0.05% H after 50 h at 500 °C under a stress of 15 kg/mm^2 being 15, 25 and 35 mm. Increasing the Al content to 5% (or more) increases the high-temperature strength of the alloy and decreases the harmful effect of H, the deformation of alloys (after 50 h at 500 °C under 15 kg/mm^2), containing 8% Al with 0.005, 0.025 and 0.05% H being, respectively, 2, 3 and 4 mm. 4) As the Al content of the Ti-Al-H alloy increases, the solubility of H also increases from 0.025% at 3% Al to 0.05% at 5% Al.

SUBMITTED: October 17, 1960

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E071/E133

AUTHORS: Kornilov, I.I., and Yakimova, A.M. (Moscow)

TITLE: Creep and structure of titanium-chromium and titanium-molybdenum alloys containing hydrogen

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no.4, 1962, 119-125

TEXT: Since chromium and molybdenum enter the composition of many heat resistant titanium alloys, the creep and structure of Ti-Cr-H and Ti-Mo-H ternary systems was investigated. The alloys were prepared in a laboratory arc furnace with a tungsten electrode in an atmosphere of purified argon. Specimens used were in the form of hot rolled rods 8 mm in diameter. Before saturation with hydrogen, all specimens were vacuo treated (10^{-4} mm Hg) at 700 °C for 24 hours and cooled with the furnace. Saturation with hydrogen at 700 °C for 10 hours and cooling with the furnace. The specimens were tested for creep by the centrifugical method directly after hydrogen saturation without any additional heat treatment. The chemical composition of alloys investigated is given (Cr and Mo

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from 0.5 to 30%). The microstructure of the alloys was studied by metallographic and microhardness methods. On the basis of the results obtained it was concluded that: 1) Hydrogen decreases the resistance to creep of alloys containing from 0.5 to 15% Cr. 2) With increasing chromium content from 3 to 7% the solubility of hydrogen in titanium increases from 0.05 to 0.5%. 3) In titanium alloy containing 7% Cr, hydrogen strengthens both the α and β phases. At 15% Cr the microhardness of the β phase decreases with increasing concentration of hydrogen due to the decomposition of the β phase and its impoverishment in chromium. 4) The resistance to creep of alloys of titanium with 3 and 10% Mo decreases strongly with increasing hydrogen content. On increasing the Mo content in alloys up to 20 and 30%, their resistance to creep increases. 5) The solubility of hydrogen in titanium increases with increasing molybdenum content.
There are 5 figures and 2 tables.

SUBMITTED: October 17, 1960

S/598/62/000/007/023/040
D290/D307

AUTHOR: Yakimova, A. M.

TITLE: The effects of hydrogen and oxygen on the structures and properties of alloys AT3(AT3), AT4 (AT4), AT6 (AT6) and AT8(AT8)

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Titan i yego splavy. no. 7, Moscow, 1962. Metallokhimiya i novyye splavy, 166-172

TEXT: The author found that a hydrogen content of up to 0.025% had a negligible effect on the strengths of AT3, AT4, AT6 and AT8. The alloy strengths were increased by ~10 kg/mm^2 by an oxygen content of 0.1%. Plasticities were unaffected by the concentrations of hydrogen and oxygen used (0.005 - 0.025% H_2, 0.1 - 0.3% O_2). AT3 and AT4 possessed high thermal stabilities; the thermal stabilities of AT6 and AT8 were lower, and fell as the hydrogen content increased up to 0.025%. The impact strengths of AT4, AT6 and AT8 were practically unaffected by hydrogen contents between 0.005 - 0.080%;

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The effects of hydrogen ...

the impact strength of AT3 fell as the hydrogen content increased. The impact strengths of the alloys were considerably reduced by oxygen since their notch sensitivities increased. It was found that the ß-phase exists in all the alloys and that it is not in equilibrium with the α-phase. Equilibrium between the two phases is approached during ageing and the process is accompanied by a redistribution of Fe and Cr between the α- and ß-phases. Hydrogen does not affect the unit cell parameters of AT3 and AT4 but it enters into the lattice of the ß-phase in AT6 and AT8 and considerably increases their unit cell parameters both after annealing and during the ageing process. The decomposition of the ß-phase into the eutectoid in AT4 is hastened by the presence of hydrogen and oxygen, and by an increase in the ageing temperature from 400°C to 500°C. There are 4 figures and 6 tables.

YAKIMOVA, A.M.

Effect of hydrogen and oxygen on the mechanical properties and the structure of a T4 titanium alloy. Fiz. met. i metalloved. 12 no.6:891-899 D '61. (MIRA 16:11)

1. Institut metallurgii AN SSSR imeni A.A. Baykova.

KORNILOV, I.I. (Moskva); YAKIMOVA, A.M. (Moskva)

Creep and alloy structure of systems titanium - oxygen - hydrogen and titanium - aluminum -hydrogen. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.3:88-93 My-Je '62. (MIRA 15:6)
(Titanium alloys--Metallography) (Creep of titanium)

ACCESSION NR: AP4040689 S/0129/64/000/006/0018/0022

AUTHOR: Yakimova, A. M.

TITLE: Hydrogen embrittlement of titanium alloys with different structures

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 6, 1964, 18-22, and insert between pp. 40-41

TOPIC TAGS: hydrogen embrittlement, oxygen, plasticity, notch sensitivity, Ti alloy

ABSTRACT: The lack of information relating to the effect of hydrogen on the phase transformation of Ti-alloys with an α plus β, β', and β structure initiated the investigation of Ti-O-H, Ti-Al-H, Ti-Cr-H and Ti-Mo-H alloys. The specimens were impregnated with hydrogen, and oxygen was added in the form of titanium dioxide. Metallographic analysis showed that the solubility of hydrogen in titanium decreased as the oxygen content increased. The hydrogen brittleness in two-phase Ti alloys was manifest in the decreased plasticity at a low rate of deformation and premature brittle fracture

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ACCESSION NR: AP4040689

during mechanical testing. Hydrogen promoted creep in all specimens while oxygen enhanced creep resistance. However, appreciable embrittlement was observed during a simultaneous increase of hydrogen and oxygen because of the lowered solubility of these gases in titanium. The author was the first to discover heightened notch sensitivity in two-phase Ti alloys brought about by the affect of hydrogen. In conclusion, the author points out that hydrogen enhances the eutectoid decomposition of the beta-phase which is accompanied by the precipitation of chemical compounds in alloys with an plus β and a β-structure. In these specimens brittleness was caused by the presence of brittle intermetallic compounds. Embrittlement in alloys with an α plus β and a β structure may also be caused by the hydrogen embrittlement of the β-phase. The decomposition of the residual β-phase may be accompanied by the precipitation of titanium hydrides which also contribute to brittleness. The orig. art. has: 7 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00

SUB CODE: MM NR REF SOV: 009 OTHER: 007

Card 2/2

SOSNOVSKIY, Vladimir Petrovich; YAKIMOVA, A.R., red.; NEZVANOV, A.A., red.

[Finishing work in housing construction] Otdelochnye raboty v zhilishchnom stroitel'stve. Ioshkar-Ola, Mariiskoe knizhnoe izd-vo, 1963. 62 p. (MIRA 18:3)

NEKHOROSHEV, Aleksey Vasil'yevich; VOZDVIZHENSKIY, Aleksandr Ivanovich; DENISOVA, S.A., red.; YAKIMOVA, A.R., red.

[Mineral riches of the Mari A.S.S.R.] Mineral'nye bogatstva Mariiskoi ASSR. Ioshkar-Ola, Mariiskoe knizhnoe izd-vo, 1964. 53 p. (MIRA 18:3)

AUTHOR: Yakimova, K. Ye. S/055/63/000/002/004/004
D251/D308

TITLE: On the equations of motion of an affine-variable body

PERIODICAL: Moscow. Universitet. Vestnik. Seriya I. Matematika, Mekhanika, no. 2, 1963, 60-64

TEXT: The author shows that the equations of motion of an affine-variable body may be obtained in Poincaré form by a method similar to that used for the deduction of the equations of motion of a similar-varying body by N. G. Chetayev (PMM, v. 5, no. 2, 1941, 253-262; Uch. Zap. Kazansk. gos. un-ta, v. 14, bk. 8, 1954, 5-8). By considering the relationship in the two-dimensional case between the coordinates with respect to a fixed rectilinear and a moving, non-rectilinear set of axes, and writing down the expression for the vis viva, the equations of motion are obtained in Poincaré form:

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On the equations of...

S/055/63/000/002/004/004
D251/D308

$$M\frac{du_1}{dt} = X_1U, \qquad M\frac{du_2}{dt} = X_2U,$$

$$\frac{d}{dt}\left\{I_x p_1 + I_{xy}(ap_2 + bk_2)\right\} = I_{xy}\left\{b(p_1p_2 + k_1k_2) + a(p_2k_1 - p_1k_2)\right\} + X_3U,$$

$$\frac{d}{dt}\left\{I_y p_2 + I_{xy}(ap_1 + bk_1)\right\} = -I_{xy}\left\{b(p_1p_2 + k_1k_2) + a(p_2k_1 - p_1k_2)\right\} + X_4U,$$

$$\frac{d}{dt}\left\{I_x k_1 - I_{xy}(bp_2 + ak_2)\right\} = I_x(p_1^2 + k_1^2) + I_{xy}\left\{b(p_1k_2 - p_2k_1) + a(p_1p_2 + k_1k_2)\right\} + X_5U,$$

Card 2/4

On the equations of... S/055/63/000/002/004/004
D251/D308

$$\frac{d}{dt}\left\{I_y k_2 + I_{xy}(p_1 b + k_1 a)\right\} = I_y(p_2^2 + k_2^2) + I_{xy}\left\{b(p_1 k_2 - p_2 k_1) + a(p_1 p_2 + k_1 k_2)\right\} + X_6 U.$$

Here, U is the force function, M is the total mass of the body, the coordinates $\bar{x}_i$, $\bar{y}_i$ refer to the fixed axes, and x_i, y_i refer to the moving axes; u_1 and u_2 are the projections of the velocity of the center of mass, p_1 and p_2 the projections of the velocity of rotation of the moving axes, k_1, k_2 the projections of the tension-compression velocity on the moving axes. The three-dimensional case is considered in a similar manner, and the corresponding equations are deduced.

ASSOCIATION: Kafedra teoreticheskoy mekhaniki (Department of Theoretical Mechanics)

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S/055/63/000/002/004/004
D251/D308

On the equations of...

SUBMITTED: October 24, 1962

Card 4/4

L 33678-66 EWT(d)/EWT(l)/EWT(m)/EWP(k)/EWP(h)/T/EWP(v)/EWP(l) WW/DJ/BC

ACC NR: AP6013813 (A) SOURCE CODE: UR/0145/65/000/010/0112/0122

AUTHOR: Zakharov, Yu. Ye. (Candidate of technical sciences); Grigor'yev, P. V. (Engineer); Ryazhkov, Yu. G. (Aspirant); Yakimova, L. D. (Engineer)

ORG: MVTU im. N. E. Bauman

TITLE: Calculation of the switch-over time for valves in hydraulic control systems

SOURCE: IVUZ. Mashinostroyeniye, no. 10, 1965, 112-122

TOPIC TAGS: valve, hydraulic device, flow control, vehicle power transmission system

ABSTRACT: The aim of the present article is to furnish designers of control systems with a set of ready made formulas and graphs which make it possible to determine the switch-over time of typical elements of the hydraulic transmission box of locomotives. The article is based on a theoretical and experimental investigation of the hydraulic control systems of Type TGK-2 locomotives and Type UGP 750-1200 hydraulic transmissions. The mathematical development is based on the following assumptions: 1) the temperature and viscosity of the working fluid are

Card 1/2 UDC: 625.282

L 33678-66

ACC NR: AP6013813

constant; 2) the compressibility of the working fluid is neglected; and, 3) the force of dry friction is assumed to be constant over the model. The article gives detailed drawings of the operating mechanism of the hydraulic transmission boxes and a series of curves based on formulas in dimensionless variables. Orig. art. has: 32 formulas and 5 figures.

SUB CODE: 13/ SUBM DATE: 13Dec63.

Card 2/2

YAKIMOVA, L.M.

Suturing the ureter with an apparatus for suturing the blood vessels.
Vest.khir.76 no.8:135-136 S '55. (MLRA 8:11)

1. Iz kafedry operativnoy khirurgii (zav.--prof. I.L. Senderovich)
Odesskogo meditsinskogo instituta imeni N.I.Pirogova.
(URETER--SURGERY) (SURGICAL INSTRUMENTS AND APPARATUS)

YAKIMOVA, L.M.

Dioctophyme renale in the kidney of a dog. Nov.khir.arkh. no.2:78 Mr-Ap '57. (MLRA 10:8)

1. Kafedra operativnoy khirurgii i topograficheskoy anatomii Odesskogo meditsinskogo instituta
(DOGS--DISEASES AND PESTS) (NEMATODA)

USSR/Human and Animal Morphology (Normal and Pathological). S-1
Methods and Apparatus.

Abs Jour : Ref Zhur - Biol., No 12, 1958, No 54981

Author : Yakimova, L.M.
Inst : Not Given
Title : The Method and Technique of Preparing and Photographing Corrosive Specimens of Human Lungs.

Orig Pub : Vracheb. delo,1957, No 10, 1087-1090

Abstract : The methods are described which the author employed in order to investigate specimens of both lungs in 5 months to 68 years old people, as well as of fetuses. The hollow elements, such as the arteries, veins and bronchi of the root of the lungs were filled. Ninety-six specimens were filled with a celloid mass, 66 with sebanit, 10 were filled with sebenit combined with celloidin, 4 with AKR-7, and 4 were filled with celloidin and mucilege BF-2--4.

Card : 1/1

YAKIMOVA, M.A., redaktor

[Northern European U.S.S.R.; school map] Sever Evropeiskoi chasti SSSR; uchebnaia karta. Otvetstvennyi redaktor IAkimova, M.A. [Moskva?] 1948. (MLRA 7:6)

1. Russia (1923- U.S.S.R.) Glavnoye upravleniye geodezii i kartografii.
(Russia--Maps)

YAKIMOVA, M. A.

The Committee on Stalin Prizes (of the Council of Ministers USSR) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Moscow, No. 22-40, 20 Feb - 3 Apr 1954)

Name	Title of Work	Nominated by
Nikishov, M. I. Zaslavskiy, I. I. Tarasov, A. P. Yakimova, M. A. Lapshina, G. M. Davydov, V. I.	"Geographical Atlas of the USSR" (for the 7th and 8th grades of secondary schools	Central Scientific Research Institute of Geodesy, Aerial Photography and Cartography

SO: W-30604, 7 July 1954

YAKIMOVA, M. A.

NIKISHOV, M.I., kandidat geograficheskikh nauk, redaktor; YAKIMOVA, M.A., otvetstvennyy redaktor; USMANOV, A.G., tekhnicheskiy redaktor

[Geographical atlas for classes 7 and 8 of the secondary school. Union of Soviet Socialist Republics] Geograficheskii atlas dlia 7-go i 8-go klassov srednei shkoly. Soiuz Sovetskikh Sotsialisticheskikh Respublik. Moskva, 1954. 76 p. (MLRA 7:8)

1. Russia (1923- U.S.S.R.) Glavnoye upravleniye geodezii i kartografii.
(Geography--Maps)

YAKIMOVA, M.A., red.

[Union of Soviet Socialist Republics; a map compiled by the Omsk Cartographic Plant of the Main Administration of Geodesy and Cartography] Soiuz Sovetskikh Sotsialisticheskikh Respublik; karta sostavlena Omskoi kartograficheskoi fabrikoi GUGK. Redaktor Iakimova M.A. Moskva, 1958. Col.map 146x231 cm. on 4 sheets 82x120 cm. (MIRA 12:6)

1. Russia (1923- U.S.S.R.) Glavnoye upravleniye geodezii i kartografii.
(Russia--Maps)

YERMOL'YEVA, Z.V.;SHERMAN, R.Z.;RAVICH, B.V.;YAKIMOVA, M.P.

Results of the treatment of dysentery with streptomycin associated with ecmoline. Klin. med., Moskva 31 no.2:26-30 Feb 1953. (CIML 24:3)

1. Professor, Doctor Medical Sciences for Sherman; Candidate Biological Sciences for Ravich. 2. Moscow.

SHERMAN, R.Z., doktor meditsinskikh nauk (Moskva); TATARINOVA, S.D.(Moskva); YAKIMOVA, M.P. (Moskva)

Results of treating chronic dysentery in children with synthomycin and streptomycin with ecmoline. Klin.med. 34 no.7:90 Jl '56. (MLRA 9:10)

1. Iz kafedry mikrobiologii (zav. - chlen-korrespondent AMN SSSR prof. Z.V.Yermol'yeva) TSentral'nogo instituta usovershenstvovaniya vrachey (dir. V.P.Lebedeva) i yasley Moskvoretskogo rayona (zav. M.P.Yakimova)

(DYSENTERY) (ANTIBIOTICS)

L 1433-66 EWT(l)/EWA(j)/EWA(b)-2 RO

ACCESSION NR: AP5024420 UR/0286/65/000/015/0121/0121
632.954

AUTHOR: Mel'nikov, N. N.; Mandel'baum, Ya. A.; Lomakina, V. I.; Stonov, L. D.; Yakimova, N. F.; Sergeyeva, T. A.

TITLE: A method of plant-growth regulation. Class 45, No. 173535

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 15, 1965, 121

TOPIC TAGS: defoliant, phosphonacetamide

ABSTRACT: Dialkoxyphosphonacetamides can be used as defoliants to control plant growth, in conjunction with herbicides. [VS]

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Protection of Plants)

SUBMITTED: 14Mar64 ENCL: 00 SUB CODE: LSOC

NO REF SOV: 000 OTHER: 000 ATD PRESS: 4108

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STAROSTIN, A.; NOVICHKOV, V.; YAKIMOVA, O.

Experiments with lactic acid bacteria in the production of smoked sausages. Mias. ind. SSSR 31 no.4:21-22 '60. (MIRA 14:7)

1. Dnepropetrovskiy myasokombinat.
(Sausages)
(Lactic acid bacteria)

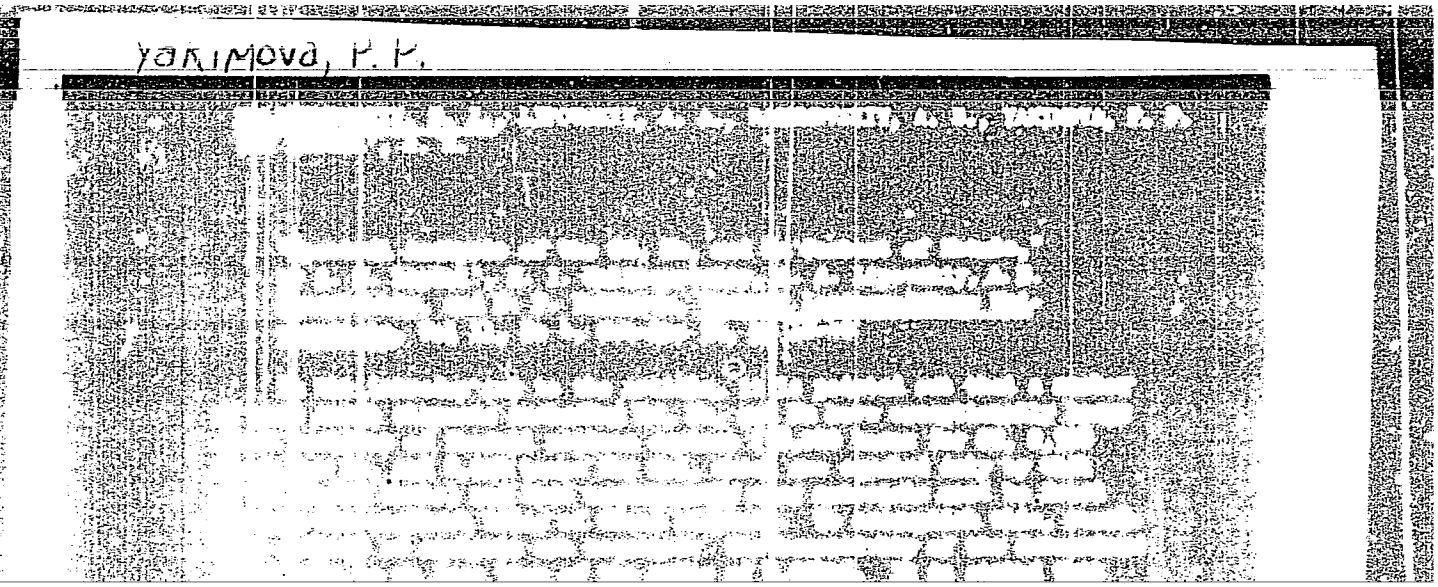
YAKIMOVA, O.F.

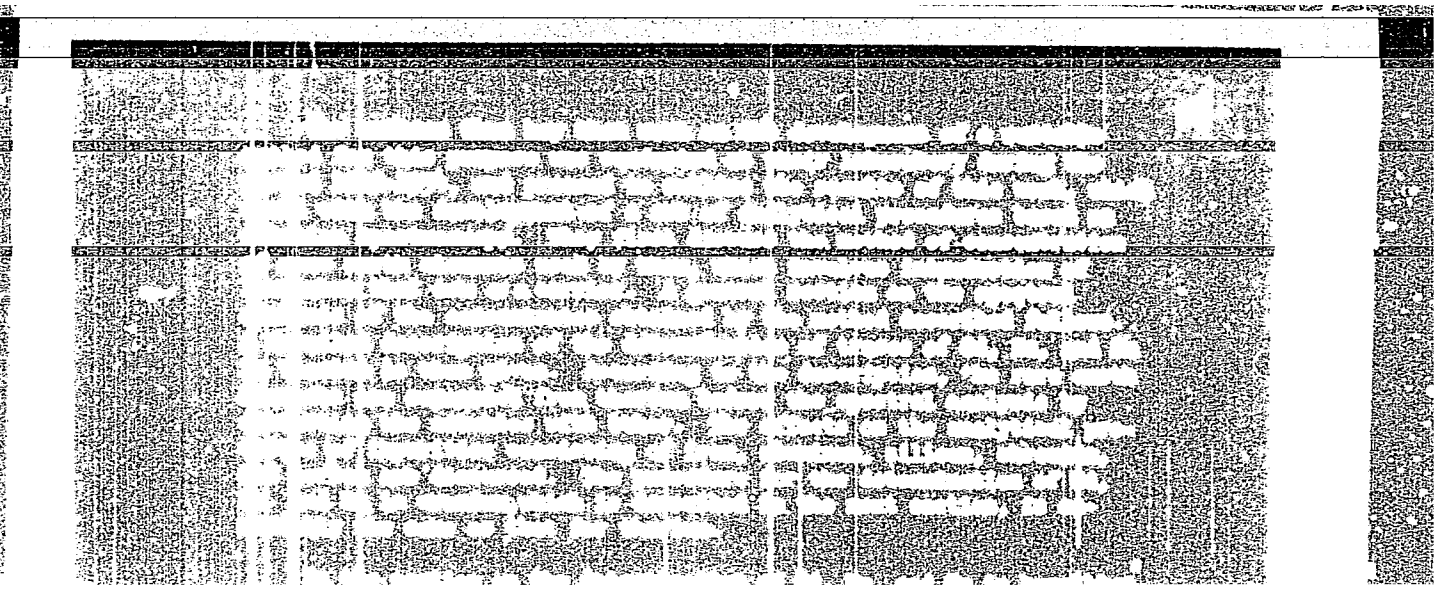
PREDEIN, P.G.; YAKIMOVA, O.F.; ZINSKIY, I.A.; SPANCHAK, I.O.; NAZAROVA, N.K.
(Gubakha, Permskaya oblast').

Professional training of mathematics teachers in pedagogical institutes. Mat. v shkole no.2:24-27 Mr-Ap '58. (MIRA 11:2)
(Mathematics--Study and teaching)

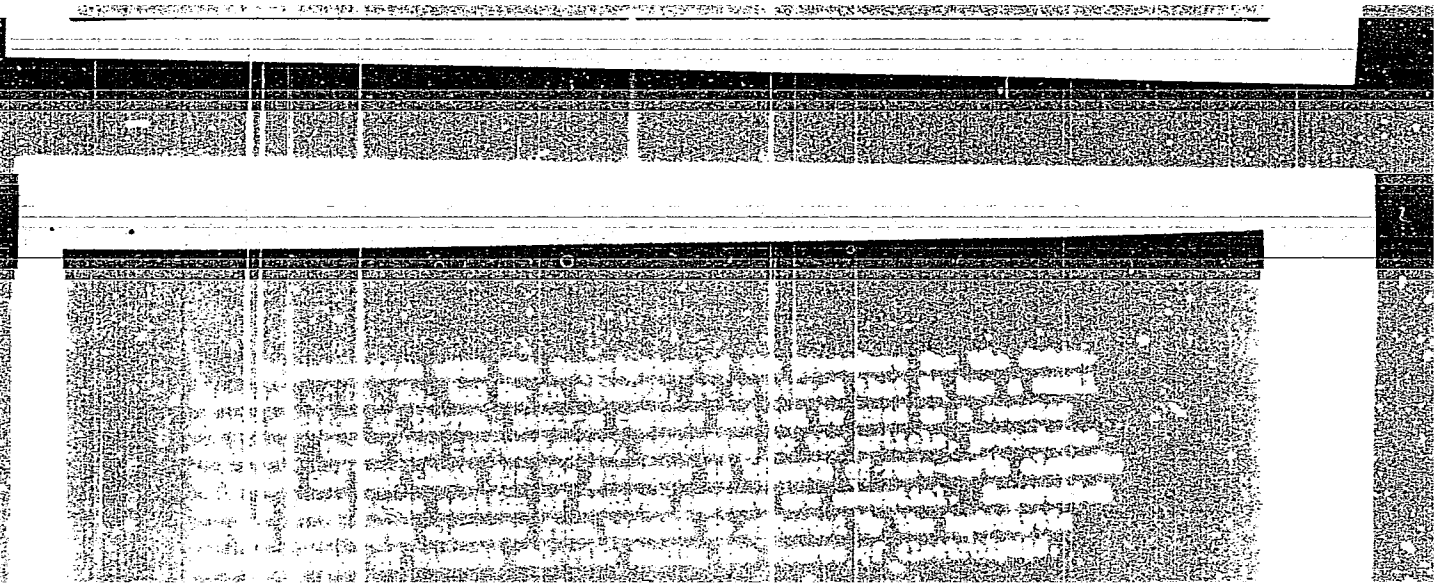
BULATOV, Panteleymon Konstantinovich, red.; BEREZINA, M.P., red.; YAKIMOVA, P.A., red.

[Fomes igniarius f.sterilis Van and its therapeutic in fourth-stage cancer] Chaga i ee lechebnoe primenenie pri rake IV stadii. Leningrad, Medgiz, 1959. 333 p. (MIRA 13:2)
(CANCER) (FUNGI--THERAPEUTIC USE)

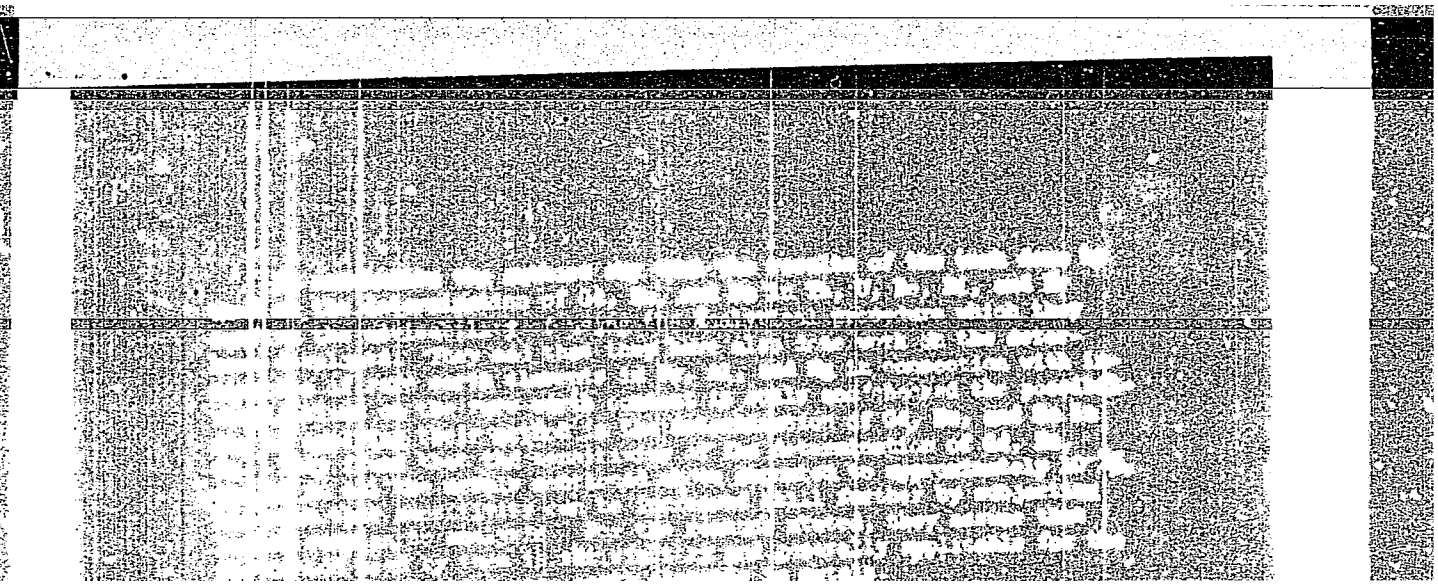




APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001961830002-1"



APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001961830002-1"



APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001961830002-1"

USSR/Soil Science - Physical and Chemical Properties of Soil. J

Abs Jour : Ref Zhur Biol., No 19, 1958, 86763

Author : Vinnichenko, E.N., Zaydel', A.N., Yakimova, P.P.

Inst : Leningrad University

Title : Determination of Cobalt in Soils.

Orig Pub : V. sb.: Primeneniye metodov spektroskopii v prom-sti prodovol'stva tovarov i s. kh., L. LGU, 1957, 23-27, Diskus. 27-28

Abstract : A method for spectral determination of Co in soils is described. Co was extracted from soil heated at 500° by boiling for 6 hours with 6% HCl. Before boiling Co^{60} was introduced into the sample for control of losses during the chemical operations. Co was precipitated in hydrochloric acid extract together with a series of other elements by ortho-hydroxyquinoline. For the separation

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USSR/Soil Science - Physical and Chemical Properties of Soil. J

Abs Jour : Ref Zhur Biol., No 19, 1958, 86726

mm, which form 62.56% in horizon A_1, predominate in the upper horizons of the turf-weakly podzolic soil of the maple-spruce wood. Sets of 1 - 0.25 mm predominate in horizon A_1 of the peat-strongly podzolic gleyey soil of the spruce-long moss woods. Described are experiments to determine the effect of selective group cutting of spruce groves on the physical properties of soils, on introducing deciduous species in a timber stand of spruce-bilberry groves, and on cultivating the soils of spruce-bilberry groves and soil reclamation with subsequent clear cutting. -- F.S. Graf.

Card 2/2

USSR/Soil Science - Physical and Chemical Properties of Soil. J

Abs Jour : Ref Zhur Biol., No 19, 1958, 86763

analyzing further one-eighth of the derived extract. With this method, the mean arithmetical error is 15%. The research was performed at Leningrad University. The bibliography lists 8 titles. -- K.V. Verigina

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YAKIMOVA, P.P.

5(2) PHASE I BOOK EXPLOITATION SOV/1727

Akademiya nauk SSSR. Institut geokhimii i analiticheskoy khimii

Redkozemel'nyye elementy; polucheniye, analiz, primeneniye (Rare Earth Elements; Extraction, Analysis and Application) Moscow, Izd-vo AN SSSR, 1958. 331 p. 2,200 copies printed.

Resp. Ed.: D. I. Ryabchikov, Professor; Editorial Board: I. P. Alimarin, Corresponding Member, USSR Academy of Sciences, I. N. Zaozerskiy, Doctor of Chemical Sciences, R. V. Koglyarov, Candidate of Technical Sciences, V. I. Kuznetsov, Doctor of Chemical Sciences, M. M. Senyavin, Candidate of Chemical Sciences, and Yu. S. Sklyarenko, Candidate of Chemical Sciences; Eds. of Publishing House: D. N. Trifonov and T. G. Levi; Tech. Ed.: S. G. Markovich.

PURPOSE: This book is intended for scientists, chemists, teachers and students of higher educational institutions, chemical and industrial engineers, and other persons concerned with the extraction, preparation, use, or study of rare earth elements.

COVERAGE: This collection contains reports presented at the June 1956 Conference on Rare Earth Elements at the Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the Academy of Sciences USSR. The articles treat chemical methods of separating rare earth mixtures, methods of processing rare earth ores, ion exchange chromatography, chemical analysis, and some industrial applications of rare earths. Aside from contributing authors, the editors mention the following Soviet scientists, who are studying rare earth elements, rare earth deposits, extraction methods, and the preparation of oxides and salts: Martynov, Mel'nikov, Khrushchev, Kolikov, Pisarzhevskiy, Chernyak, Tanatar, Belousov, Zhukov and especially, N. A. Orlov, who first obtained the majority of rare earth elements in the pure state, separated many complex molecular compounds of these elements, and determined their specific properties. References are given at the end of each article.

TABLE OF CONTENTS:

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ZAYDEL', A.N.; KALITEYEVSKIY, N.I.; LIPOVSKIY, A.A.; RAZUMOVSKIY, A.N.; YAKIMOVA, P.P.

Spectrochemical determination of Gd, Eu, and Sm in metals. Fiz.sbor. no.4:37-40 '58. (MIRA 12:5)

1. Fizicheskiy institut Leningradskogo ordena Lenina gosudarstvennogo universiteta imeni A.A.Zhdanova.
(Gadolinium--Spectra) (Europium--Spectra) (Samarium--Spectra)

YAKIMOVA, P. P.

AUTHORS: Kaliteyevskiy, N. I., Lipovskiy, A. A., Razumovskiy, A. N., Yakimova, P. P. 75-13-3-24/27

TITLE: Spectroscopic Analysis by Means of Evaporation (Spektral'nyy analiz metodom ispareniya). Communication 6. The Determination of Cadmium, Germanium, Indium, Gallium, Gold, Antimony and Lead in Pitchblende (Soobshcheniye 6. Opredeleniye kadmiya, germaniya, indiya, galliya, zolota, sur'my i svintsa v zakisi-okisi urana)

PERIODICAL: Zhurnal analiticheskoy khimii, 1958, Vol. 13, Nr 3, pp. 372-373 (USSR)

ABSTRACT: The principles for methods of evaporation were published in earlier papers (References 1-3). The possibility was also shown to determine admixtures of other elements in the difficultly volatile oxides U_3O_8, Al_2O_3, ThO_2, BeO_2 in this manner. The main condition for the efficiency of an evaporation method is a sufficiently high difference in the liquids among the admixtures to be determined and the chief component. In the present paper an evapora-

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Spectroscopic Analysis by Means of Evaporation. Communication 6. The Determination of Cadmium, Germanium, Indium, Gallium, Gold, Antimony and Lead in Pitchblende

tion method for the determination of a number of liquid elements (Cd, In, Ge, Ga, Au, Sb, Pb) in pitchblende is worked out. Experimental data on the evaporation of the admixtures were already described earlier (Reference 1). The evaporation is performed at the air, as on heating in a vacuum a decomposition of U_3O_8 under formation of the more easily volatile UO_3 takes place. In the determination of $\sim 3 \cdot 10^{-5}\%$ cadmium and indium difficulties arose. At 1600-1700°C an intensive evaporation of CdO occurs, but it is not complete, as cadmium is anew deposited at the electrode on a temperature rise to 1900-2000°C. For avoiding a systematic error the evaporation must therefore by all means be performed at $\sim$2000°C. This temperature is also sufficient for completely expelling all oxides of all other elements to be determined (In, Ge, Ga, Au, Sb, Pb) and is not high enough to cause a marked evaporation of U_3O_8. For the determination of

Spectroscopic Analysis by Means of Evaporation. 75-13-3-24/27
Communication 6. The Determination of Cadmium, Germanium, Indium, Gallium, Gold, Antimony and Lead in Pitchblende

Cd, In and Sb weighed portions of 200 mg U_3O_8 had to be made.
When dividing this amount into four portions and four times evaporating the admixtures at the same electrode a more intensive blackening of the respective spectral lines occurs than in works with the total amount. The division therefore increases the sensitivity, but considerably retards the analysis. The technical data of the spectroscopic analysis of the sublimates are given in the paper.
As the sensitive lines of the elements to be determined lie in different parts of the spectrum it is expedient, simultaneously to photograph the spectrum on 2 spectrographs (ISP -22 or Q-24 and ISP -51). For the line In I (4511,3 Å) silver electrodes were used, as on copper electrodes this line of indium is overlapped by the intensive line Cu 4509,4 Å. For recording the line Cd II (2265 Å) which lies in the distant ultraviolet special photographic plates ("spektral'nyye", type III) were used. The

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